

6-25-79 hearing



CO-OP MINE
CO-OP MINING COMPANY

P. O. BOX 300
HUNTINGTON, UTAH 84528
PHONE (801) 748-2777

May 21, 1979

Elhelut #11

BEAR CREEK CANYON PORTAL

(Application #2)

782.13 (a) (1) Applicant

Co-op Mining Co. 53 West Angelo Ave.
Salt Lake City, Utah 84115
Tel. 801-486-5047

(2) Land and coal owner

Peabody Coal Co. 301 North Memorial Drive
Saint Louis, Mo. 63102

(3) Lease Holder Same as applicant

(5) Operator Same as applicant

(6) A V Gustafson
1798 South 9th East
Salt Lake City, Utah

(b) Partnership

(1) Wendell Owen 808 South 1800 West
Woods Cross, Utah, 84087

Ellery Kingston 140 East (30 South
Sandy, Utah 84070

Elden Kingston 991 East 3825 South
Salt Lake City, Utah 84106

Earl W Stoddard Box 300 Huntington, Utah 84528

Gerald Hanson Box 300 Huntington, Utah 84528

John Gustafson 1815 South 1100 West
Woods Cross, Utah 84087

Arnold Pratt 1526 South 1100 West
Woods Cross, Utah 84087

(3) Same as (a) (1)

(c) same as (b)

(d) Permit no. ACT/015/021 Oil Gas and Mining Div., State of Utah

(e) Peabody Coal Co.

U S Forest Service

(f) MSHA no. 42-00081-0

(g) none

782.14 (A) (1) no
(2) no

(c) Violation # 78 V-1-1 7/21/78 1A through 1G

Non compliance of surface water control and combustible materials burning.

(4) Pending Modification of notice 11/13/78

(5) Applicant has made corrections on violations.

(c) Compliance order by Utah Oil Gas and Mining Division 11/29/78

782.15 (a) Coal mining lease, by and between applicant and Peabody coal co.,

executed Dec. 1st, 1975

area T16, R7e, S L M

Sec. 14 SW $\frac{1}{4}$

" 23 E $\frac{1}{2}$, E $\frac{1}{2}$ NW $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SW $\frac{1}{4}$ SW $\frac{1}{4}$

" 24 all west of N-S fault

The right to mine and remove coal from, and use for purposes incident to mining, including access roads, camp facilities, surface operations, storage of coal, and other activities. Also unrestricted use of all access roads leading to and from property.

782.16 (a) Exempt

(b) Coal lease dated 12/1/75

782.17 (a) Starting date for construction of mine entries and coal handling facilities immediately following approval of application. It is not possible to project starting time for actual mining until permit is approved (season of year ect.) Termination of mining operations will be when all coal has been removed from lease area, subject to renewal of permit, if more than five years are needed.

Surface area to be affected; five acres.

Horizontal extent; that portion of the lease area that is occupied by the Black^{hawk} formation. (Approx. 450 A.) Vertical extent; the two coal seams located at approx. 7400 ft. alt. (see cross section).

782.18 Insurance; State insurance Fund, Policy # C0652

783.12 (a) This is a small operation and is not divided into sub-areas

(b) none

783.13 See 783.14, 783.15, 783.16

783.14 (a) (1) Does not apply. The area of the surface operations is at a lower altitude than the coal seam. No coal is below this area.

(2) The geological structure of the proposed mining area is best described by the original maps and data compiled by E. M. Spieker. In many areas that have already been mined at various locations, his observations have proven to be quite accurate. We are enclosing a copy of some of these works, as we don't feel they can be improved upon. Due to the extreme rugged nature of the area, there are many open face ledges and cliffs where one can observe the formations he has recorded, without benefit or need of drilled holes.

783.15 Also included is some information from the U S Forest Service on water in the general area, including locations of springs etc. According to this map, the mountain in which we propose mining (from the Bear Creek canyon west to the next major fault) does not have any springs on or above the level of the coal seams. A few dry seeps (small amounts of water in wet seasons, and drying up in dry seasons) were noted. Our own search of the area proved this to be correct. Even in the spring season, there is no water coming from this mountain, from any formation from and including the Star Point sandstone up to the mountain top, in sufficient quantity to reach Bear Creek without soaking back into the ground. The geological structure of the mountain on the Trail Canyon side of the fault is identical, and mining in this mountain shows absence of aquifers, as we

783.15 (cont.)

have never encountered any water in our mining experience, other than dripping from the roof, and small seeps in various places during the wet seasons. It is our observation that the many layered formation of the mountain, criss-crossed with the faults of the Pleasant Valley fault zone, makes the ground to porous to retain any water in any large quantity.

783,16 Surface water in the area consists of a small stream (Bear Creek) adjacent to the mine plan area, which flows into the Huntington river (Huntington-Cleveland watershed).

Quantity of water flow in Bear Creek

Date	Cu. ft. per sec.
8/10/78	.091
10/25/78	.076
11/8/78	.057
12/13/78	.042
3/7/79	no water

Analysis:	Iron	0.158	Mg p l
	Manganese	6.220	"
	Suspended solids	30,000	"
	PH	7.06	

Sample taken 5/1/79

783.20 (b) Applicant requests determination as to what fish and wildlife information is required.

783.21 Soil information

- (a) (1) The area affected by the surface operations is very small and the soil is the same in all parts.
- (2) The soil consists of a residue of the sandstone shale and other shales deposited from the natural erosion of the ledges above, mixed with small amounts of clay, and traces of limestone from the North Horn formation.
- (3) The soil is extremely rocky (see photographs) including very large

783.21 (a) (3) (cont.)

boulders. It is very porous, and has a high water absorption rate.

- (4) Present productivity is non-existent. Potential is limited to grasses that can help support wild life (see 817.46). Any type of agriculture is impractical due to the rocky nature of the soil.

783.22 Land use

- (a) (1) Of the four acres to be used for coal screening and storage, approximately three acres, having been previously used for a coal mining operation, is strewn with coal and debris and is in a very poor condition. (see photos A, B, and C). The other acre is partially covered with trees (mostly cedar) but also contains some coal and debris (photos D and E) that has been washed down from the coal waste pile in the former tipple area (seen in background in photo E). The one acre for the sedimentation pond is shown in photo F.

- (2) See 783.21

- (b) Previous mining

- (1) Mining method; drilling and shooting coal, hand loading,hauling to surface with horse drawn cars.

- (2) Mine was in Bear canyon coal seam. (see cross-section)

- (3) Approximately 160,000 tons of coal removed.

- (4) The mine was operated spasmodically from 1896 to 1906 and continuously from 1938 to 1957.

- (5) There is no record of any previous land use.

- (c) none

783.24 & 783.25 see maps and cross sections.

783.27 Prime farmland. Applicant requests negative determination on the basis of 783.27 (b) (1, 2, and 4).

784.11. Operation plan

- (a) We have currently underway an engineering study, to include the study of aerial and satellite photography, available through the ground support branch of MSHA; the study of geological maps and information available from the State and Federal government Geological Surveys; and an on site survey of outcrops, and the extent of overburden at the various locations. With this information we will develop a mining plan to include points of entry, direction of the run of mine entries, size of pillars, and a roof support plan for specific locations; (full bolting, spot bolting, timbering, etc.). Mining is to be done with continuous miners. Haulage to the surface with a conveyor belt, fed by rubber tire shuttle cars unloading at the belt feeder-breaker. Outside equipment will consist of crushing and screening equipment, with belts to convey the coal to the stockpiles. Trucks will be loaded with front end loaders. Anticipated production is 150,000 tons the first year and 300,000 tons per year beginning the second year.
- (b) (1) see 817.45
- (2) see 817.21 & 784.13
- (3) Coal sizing and separation facilities will be installed a short distance from the mine portal. It will be constructed of steel mounted to concrete footings. It will be covered for weather protection, with consideration of design for both durability and esthetic qualities. Sized coal will be carried to the stockpile area by conveyor belt. Stockpiling towers will be of the shielded silo type for dust control, and will also be of steel mounted on concrete footings. All structures and equipment will be maintained in good condition for the life of the mining operation, at which time it will be removed, and the area reclaimed as outlined in 817.101 to 817.114.
- (4) No wash plant is included in the proposed mining plan, so no coal processing waste is anticipated. Any mine development waste that does not contain coal

784.11 (b) (4) (cont.)

will be disposed of underground. Should any combustible material need to be disposed of, it will be done as follows; the area selected will have the topsoil removed and stockpiled, the waste material will be spread in a layer not to exceed two feet in depth, compacted, buried with topsoil and reseeded (see 817.111).

(5) see 784.11 (a)

(6) see 817.41 - .45 - .46; 817.101 - .111

784.12 Antiquated wood in bad repair. To be demolished and removed.

784.13 (b) (1) All machinery, equipment, and structures shall be removed from the permit area in not more than six months from the date of completion of mining operations. Disturbed area will be regraded within an additional 90 days, from snow depth and weather permitting, or 90 days from the date work can begin. Reseeding will be at the next favorable planting season thereafter. Mine openings will be sealed immediatly after termination of mining operations.

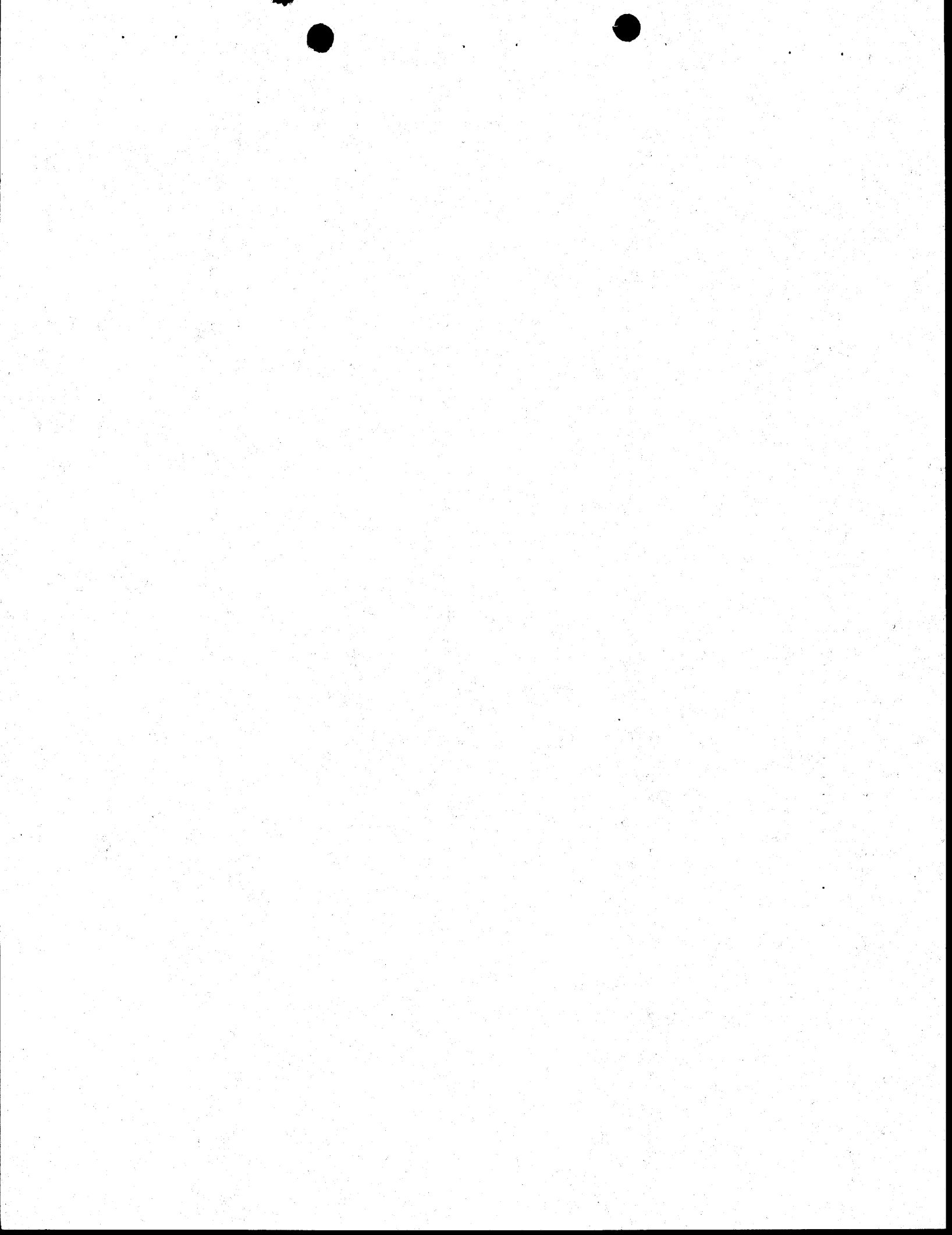
(2)	Removal of structures and equipment.		\$1,000.00
	Removal of trash and debris		\$1,000.00
	Leveling access roads	1 mile	\$1,500.00
	Earthwork and grading	4000 yds.	\$2,700.00
	Soil preparation	6 acres	\$ 150.00
	Seeding	"	\$ 900.00
	Supervision	60 hrs.	\$ 600.00
	Covering portals	4	\$2,000.00
	Hazardous materials		\$ 100.00
	Reseeding	6 acres	\$ 900.00

			\$10,850.00
	5% inflation		542.50

			\$11,392.50

(3) When area has been cleared, it will be regraded to a slope as shown on map, (original grade), compacted ready for topsoil.

(4) Applicant requests council from Oil, Gas, and Mining Division concerning topsoil handling due to extreme rocky surface conditions (see phothgraphs).



784.13 (b) (cont.)

- (5) see 817.111
- (6) Plan is to mine entire seam to surface coal or property lines in all directions. If in any area the seam is thicker than a mining machine will reach in one pass, the extra coal is left on the floor during development work, and the seam is mined to the top. The bottom coal is then picked up at the same time the pillars are mined.
- (7) Coal analysis shows non-toxic, not acid forming when mixed with soil.
Combustible material (see 784.11-b-4)
- (8) see 784.14 (d)
- (9) Clean air (see 784.26)
Clean water (see 784.14)

784.14 (a) (1) see 817.41 - 817.45

- (2) Surface water runs adjacent to, but not through proposed mining area. No water will be taken from creek, and rainfall from disturbed area will pass through a sedimentation pond before entering creek.
Underground water (see 783.13)
- (3) Same as para. (2)
- (4) All studies (see 783.13) including on site inspection of the old Bear Creek canyon mine, and previous experience in the trail canyon mine (which has the same elevation and geological structure) indicate we will not encounter sufficient water underground to be discharged to the surface. Mine openings shall slope inwardly to make sure there is no gravity discharge in the event any such encounter should occur.
- (b) (1), (2), (3). see 817.41, 45, & 52
- (c) The probable consequence of the mining activities on water will be to leave it unchanged. Water will be monitored to insure good results.

784.14 cont.

- (d) Mineopening seals will be designed to withstand any anticipated water pressure that may develop after permanent closure (see cross section).

784.15 see 783.21 (a) (4)

784.16 No ponds or structures are included in reclamation plan. Pond used during mining operations will be regraded at that time.

784.17 none

784.18 none

784.19 see 784.11 (b) (4)

784.20 Subsidence.

No structured or renewable resources exist within the proposed permit area.

Applicant requests negative determination.

784.21 see 783.20

784.22 none

784.23 see maps and cross sections

784.24 Roads. see maps and also 817.50 and 817.60

784.25 see 784.11 (b) (4)

784.26 (a) Applicant requests determination from O G M Div. if an air monitoring plan is needed.

(b) Dust control see 817.95



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(1) TYPE OF MINING OPERATION

Underground mining only, no overburden shall be removed. Surface operations will include sizing and screening of coal, and limited coal storage areas, including conveyors carrying coal to storage areas. It will not include a wash plant, or other type of waste removal, leaving no waste to be disposed of. There will not be any underground water discharged to the surface for use or disposal.

(2) FIRE PREVENTION

Should any combustible material need to be disposed of, it will be done as follows; the area selected will have the topsoil removed and stockpiled, the waste material will be spread in a layer not to exceed two feet in depth, compacted, buried with the topsoil, and reseeded to prevent erosion. There will be a continuing program of regular inspection of all mining property, to detect any sign of spontaneous combustion, to be immediately extinguished.

(3) 817.11 SIGNS AND MARKERS

A sign identifying the mine area will be placed at the entrance to the mine access road, where it leaves the Huntington canyon road. It will show the name, business address, telephone number, and permit number of the company. Perimeter markers shall be placed at the perimeter of the areas of the surface operations. Topsoil shall be placed at topsoil stockpile sites.

(4) 817.14 COVERING UNUSED UNDERGROUND OPENINGS

Should any mine opening become temporarily inactive, it shall be barricaded and fenced and warning signs shall be posted.

817.15 Upon completion of mining operation of any portal or other opening, the opening shall be permanently sealed to prevent entry. (also see 784.14 (d))

817.21 Topsoil see 784.13 (4)

817.41 to 817.45 Hydrologic system

Surface water from undisturbed areas will be diverted from disturbed areas with temporary diversion canals. Surface water from disturbed area will be collected and channeled to a sedimentation pond, (see 817.46). (See also maps and cross sections). When dewatering is required, water samples will be taken for analysis, which will be included in the quarterly report to the regulating authority. When or before sediment reaches 60% of storage capacity it shall be removed. If it does not contain enough coal to salvage, it will be deposited in the area directly up slope from and adjacent to the pond, where it will be reseeded (see 817.111).

817.50 see 784.14 (a) (4)

817.52 (a) Underground water in the mine does not come from any one or a few points, but accumulates from seepage and drippings from the roof from large areas, and is subject to constant variation. The nearest we can come to accurate water volume measurement is by the amount we pump for dust control; if our water sumps do not fill faster than we are using it, there is no significant change in volume. If it should change, and we encounter more water, we will notify the Division within a week.

(b) Samples of the surface water in the natural drainage shall be collected at two points, (see map), one above and one below the disturbed area, once each month. If we encounter any springs, samples will be taken twice yearly, once in the spring and once in the fall. At the same time, quantity will be measured on the above. Samples will be analyzed, and all information sent to the Division in quarterly reports, or within 5 days if a violation should occur.

817.59 see 784.15 (b) (6)

817.61 none

7.

7.

7.

7.

7.

7.

7.

7.

SEDIMENTATION POND DESIGN

Height of dewatering device (maximum sediment storage)	36"
Height of water storage (dewatering level to spillway)	22"
Freeboard (1' minimum and 4" allowance for water swell)	16"
Total settled height of embankment	<u>74"</u>
Construction height (allowance for settling)	80"
Pond area	1 acre
Disturbed area	4 acres
Sediment storage	3 Acre feet
(.75 per acre of disturbed area)	
10 year 24 hour rainfall experience	2.4 in.
	times 4 acres
	<u>9.6 = .8 acre feet</u>
Rainfall runoff	75% = .6 acre feet
Water storage capacity of pond	1.83 " "
% of required capacity	300 %

Pond design is oversized in the event of future expansion, and for maximum evaporation. Dewatering device will consist of a vertical stand pipe connected to an outlet pipe with a manually operated valve, and will be installed on opposite end of pond from pond inlet. A skimming device will be placed at the pond inlet. Spillway will be 16" below top of settled height, 48 inches wide, and will include a concrete apron and/or other device to prevent erosion.

817.95 (b) Dust control practices to include, as needed;

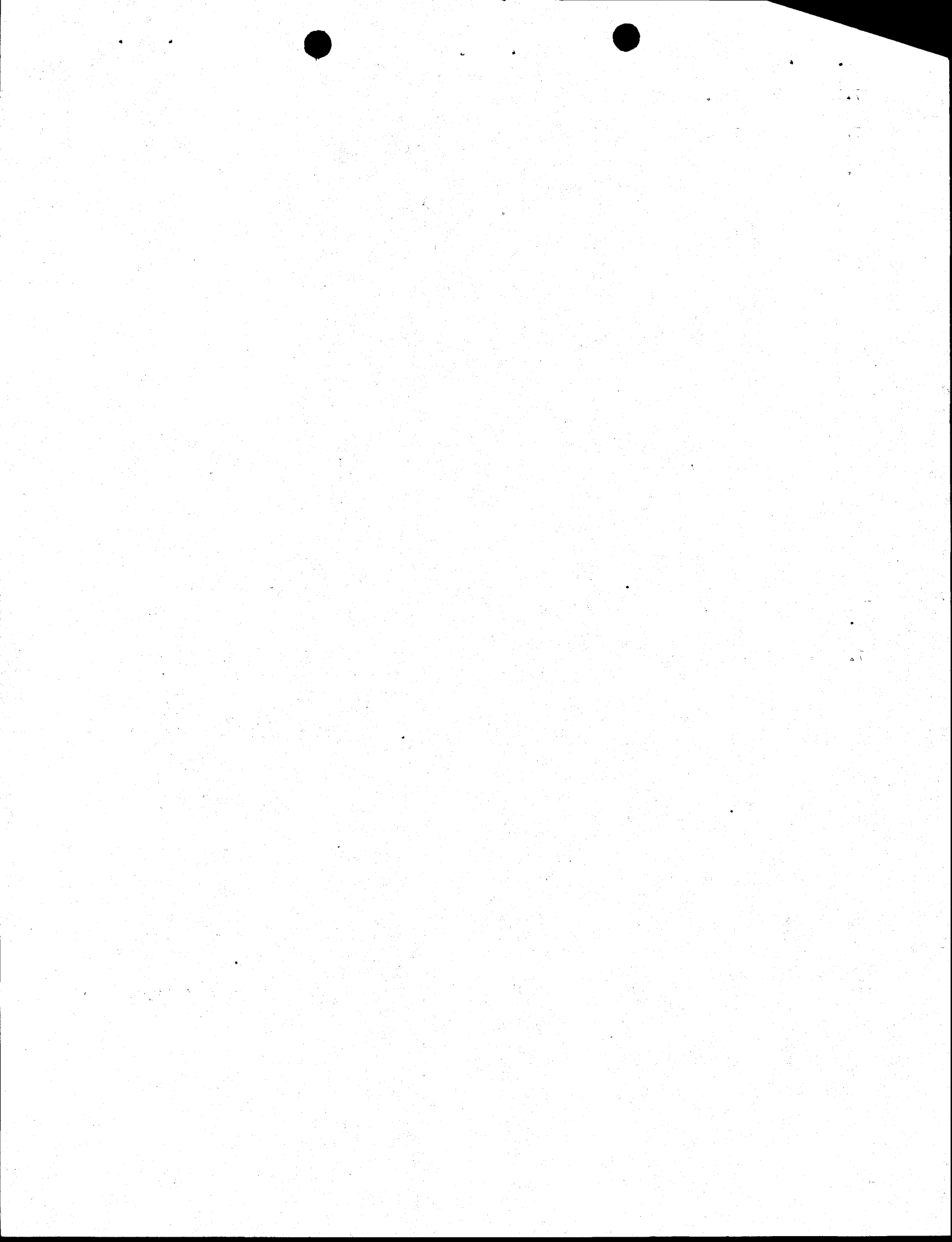
- (1) Periodic watering of unpaved roads
- (2) Make experiments with chemical stabilization.
- (4) Removal of dust forming debris with frequent scraping.
- (5) Restrict vehicle speed.
- (6) Revegetate areas adjoining roads.
- (7) Restrict off-road travel.
- (8) Cover trucks.
- (9) Cover conveyors if needed.
- (10) Minimize disturbed area.
- (11) Prompt revegetation of disturbed areas.
- (12) Restrict dumping, and wetting materials while handling if needed.

- 817.71 see 784.11 (4)
- 817.101 see 784.13 (b) (1) (3) (4)
- 817.111 Reclaimed areas shall be prepared for seeding, and seeded at the next favorable season for planting. Seed mixture as follows:

Crested wheat grass	6# per acre
Luna pubescent wheat grass	2# per acre
Russian wild rye	6# per acre
Yellow sweet clover	6# per acre
Ladac alfalfa	2# per acre
Small burnet	2# per acre
Sage brush	½# per acre
Rabbit brush	½# per acre
Four wing salt bush	½# per acre

According to reports from the State Experimental Station in Ephriam, Utah, hydroseeding has not been to sucessful in this state because of insufficient rainfall. They recommend seeding very late in the fall with a hand cyclone seeder and covering with a straw mulch, as they have had the best results with this method. (See map for our own test plot also).

- 815.150 Class 1 Haulage roads, and
- 817.160 Class 11 Access roads will be constructed with side ditches, and with culverts at the points where the road crosses natural or constructed drainages, and where ditch relief culverts are required. Culverts and ditches will be large enough to handle the peak runoff of a ten year twenty-four hour precipitation event. Soil erosion will be prevented by planting vegetation, by rock placement at the ends of culverts, or other necessary means. Haulage roads are to be surfaced with road base comparable to that used by the county road department. Material and access roads will be surfaced as needed for slower moving, lighter vehicles, traveling less frequently. All roads shall be maintained by regular grading. Dust control practices (817.95) Shall apply to all roads. When roads are no longer needed, culverts shall be removed, roads scarified, and reseeded.



783.14 (a) (2)

- (ii) See accompanying excerpts from Utah geological and mineral survey publication. Also, see our own maps and cross-sections, which will follow when they are completed by draftsman.
- (iii) Samples of rock and coal have been sent for analysis, which will be submitted when recieved.
- (iv) See accompanying chart on the Bear Canyon bed. The Co-op Mine coal seam is very similiar in analysis to the Bear Canyon side of the fault. See sulpher determinations listed under Co-op Mine. No marcsitè is present in any of the analysis sheets we have on coal.

Table 34. Average coal analyses, Hiawatha NE quadrangle.

	No. Analyses	As-received (percent)	
		Average	Range
BEAR CANYON BED			
Moisture	6	6.8	4.5-10.9
Volatile matter	6	45.8	37.4-46.0
Fixed carbon	6	45.7	44.9-46.0
Ash	6	4.5	3.8-5.8
Sulfur	6	0.53	0.5-0.6
Btu/lb	6	13,014	10,840-13,530
BLIND CANYON BED			
Moisture	10	4.8	3.8-5.3
Volatile matter	9	41.7	40.2-44.7
Fixed carbon	9	44.3	39.2-48.3
Ash	10	8.9	5.8-12.4
Sulfur	8	0.58	0.5-0.6
Btu/lb	9	12,492	11,700-13,080
HIAWATHA BED			
Moisture	370	5.6	0.7-11.0
Volatile matter	357	42.3	36.3-46.4
Fixed carbon	357	45.7	38.3-52.7
Ash	359	6.2	3.3-11.2
Sulfur	330	0.61	0.29-1.1
Btu/lb	365	12,719	11,521-13,600

Table 35. Sulfur-type determinations, Hiawatha NE quadrangle.

Mine	Bed	Percent			
		Total Sulfur	Sulfate	Pyritic	Organic
King mine	Hiawatha	0.58	0.02	0.16	0.40
Co-op mine	Hiawatha	0.36	0.00	0.04	0.32
Sea Gull mine	Blind Canyon	0.50	0.01	0.04	0.45

Table 36. Carbonization product yields, Hiawatha NE quadrangle.

Mine	Carbonization yields wt. percent of mat coal				Gas volume scf/lb mat coal	Heating value of gas Btu/scf
	Char	Water of decomposition	Tar plus light oil	Gas		
Co-op	69.5	4.7	21.0	3.8	837	845
King	69.6	5.0	19.8	4.7	907	808
Watts No. 2	70.9	5.1	18.1	4.9	952	792

HIAWATHA NE QUADRANGLE

LOCATION, GEOGRAPHY AND ACCESSIBILITY

Hiawatha NE is located in the north central part of the Wasatch Plateau coal field, centered around the south half of Gentry Mountain (figures 22 and 40). The coal mining towns of Hiawatha and Mohrland are located along the east edge of the map. The mouth of Huntington Canyon is in the south part of the quadrangle.

The landscape is rugged and cliffy. The only flat land is on top of Gentry Mountain between 9,250 and 9,750 feet above sea level. The highest elevation on the quadrangle at the north end of Gentry Mountain is more than 9,850 feet above sea level; at Hiawatha elevation is 7,181 feet, at Mohrland about 7,400 feet and along Huntington Creek lowest elevation is 6,300 feet. The coal lies between 7,500 and 8,250 feet. The town of Huntington is located about 4 miles to the southeast.

Highway accessibility is available to Mohrland, Hiawatha and along Huntington Canyon; the remaining area is inaccessible by vehicle. The Utah Railway (Utah Coal Route) extends from Helper to Mohrland via Hiawatha. Most of Hiawatha NE is in Emery County. The northeast corner, including Hiawatha, is in Carbon County.

STRATIGRAPHY

The exposed geologic column extends from the Emery Sandstone Member of the Mancos Shale to the North Horn Formation. Terrace gravels on the Mancos below the cliffs occur nearly everywhere between stream channels; alluvium is in the dominant stream channels.

In Hiawatha NE the Emery Sandstone is a pair of yellow-gray sandstone tongues. Between the tongues is a gray sandy shale of the same description as the shale members of the Mancos above and below the Emery. The tongues are possibly discontinuous in outcrop; it is difficult to differentiate the Masuk from the Blue Gate Shale. The Emery outcrops in the southeast map area.

The upper shale member of the Mancos exposed at the base of the cliffs is estimated to be more than 1,000 feet thick; it consists of blue-gray sandy shale. The initial cliffy unit is the Star Point Sandstone, the lower formation of the Mesaverde Group. It is basically a littoral sandstone with thick-bedded to massive beds separated by subordinate Mancos-like shale.

The Blackhawk Formation, named for the Blackhawk mine in sec. 3, T. 16 S., R. 8 E., just south of Hiawatha, is the most important unit. The alternating sandstone, shale and coal unit is about 1,000 feet thick in the vicinity of Mohrland. The outcrops form a step and slope topography slightly less resistant than the Star Point below and the Castlegate above. At least five valuable coal beds in the Hiawatha area occur in the lower 350 feet of the formation.

The upper Mesaverde or Castlegate and Price River formations are thin on Gentry Mountain compared to elsewhere. The coarse-grained sandstone beds are cliffy and resistant. The combined thickness varies from 350 to 500 feet on the Hiawatha NE.

Atop Gentry Mountain is the North Horn Formation (T_W). The variegated shales, thin limestone and sandstone beds are basically nonresistant. At least 750 feet of the unit are present on the Hiawatha NE quadrangle.

STRUCTURE

The beds under Gentry Mountain are nearly flat; except for disturbed beds near the faults in the west half of the quadrangle.

all beds dip almost unnoticeably. Of concern are the faults. Pleasant Valley fault zone trending nearly north-south with located from Bear Creek Canyon westward to Trail Ca. According to Spieker (1931, p. 144-145):

In Tie Fork Canyon (in the northwest corner of the Hiawatha NE quadrangle) the zone comprises five well defined faults, but between them Bear Creek Canyons, where the zone crosses Huntington Canyon there are 12 major faults, many of which are accompanied by shear zones and numerous smaller faults. These faults have obviously disturbed the bordering Huntington Canyon in the southeastern part of T. 16 S., R. 8 E. to an extent that will greatly hamper mining, but in the northeastern part of both T. 16 S., and T. 17 S., R. 7 E., the larger faults seem to be spaced widely enough to allow considerable mining in the intervening blocks.

The displacements of these faults vary to 450 feet.

PROPERTY CONTROL

The breakdown of land ownership of the Hiawatha NE quadrangle is as follows: private 54 percent, National Forest Service 20 percent, Bureau of Land Management 20 percent and state of Utah 3 percent.

Coal lands amount to 60.6 percent of the area, they are equally divided between the National Forest Service and private coal companies. State of Utah and BLM properties are barren with respect to Blackhawk coal. Four coal companies own and control the leases. Listed acreages are approximate and dated January 1, 1970.

	Acres	Type
Huntington Corp.	3,720	Fee
	3,200	Lease
Kingston	20	Lease
Paramount Fuel	180	Fee
	1,160	Lease
U. S. Fuel Co.	10,250	Fee
	4,250	Lease

Acreages held in leases plus coal fee lands total more than the acreages of actual coal land. Much of the fee land is in canyons bottoms or below the cliffs. The only large block of open land in the northwest corner of the map area in the vicinity of W. Cattle Hollow, Gentry Ridge and Gentry Hollow. Locations of land holdings are shown on figure 16.

COAL

Surface by structure

Six beds or zones are represented by 119 measured sections (figure 41) which attest to the condition of the coal in the Hiawatha NE quadrangle. The beds and zones are described by their relative positions in the column: the first section is in Hiawatha, the second near Mohrland and the third in the Huntington Canyon.

Hiawatha	Feet	Mohrland	Feet	Lower Huntington Canyon	Feet
Tank bed	0-6	Upper beds	thin beds	Upper beds	0-6
Interval	200		in a	Interval	200
Wattis bed	8-12		250-foot	Bear Canyon bed	7-12
Interval	70		interval	Interval	40
Third bed	0-9	Interval	50	Third Canyon	0-9
Interval	20	Bear Canyon bed	0-6	bed	0-6
second bed	0-7	Interval	100	Interval	40
Interval	30	Hiawatha	2-28	Hiawatha	5-30
Hiawatha	5-20	Star Point Sandstone		Star Point Sandstone	5-20
Star Point Sandstone					

The Hiawatha bed is present in all three localities. It is important and valuable almost everywhere and only locally in the